

2011 NASA Public Health Applications Program Review will be held September 14 – 16, 2011 at La Fonda on the Plaza, Santa Fe, NM.

Title: Identifying Geographic Areas at Risk of Soil-transmitted Helminthes Infection Using Remote Sensing and Geographical Information Systems: Boaco, Nicaragua as a Case Study

Authors:

Max J. Moreno¹, Mohammad Z. Al-Hamdan², David G. Parajón³, Douglas L. Rickman⁴, Jeffrey Luvall⁴, Sue Estes², and Erika Podest⁵

(1) NASA Postdoctoral Program/ORAU, Earth Science Division at NASA Marshall Space Flight Center, National Space Science and Technology Center, 320 Sparkman Drive, Huntsville, AL 35805.

(2) Universities Space Research Association at NASA Marshall Space Flight Center, National Space Science and Technology Center, NASA Global Hydrology and Climate Center, 320 Sparkman Drive, Huntsville, AL 35805.

(3) AMOS Health and Hope, Apdo. Postal 5051, Managua, Nicaragua.

(4) Earth Science Division at NASA Marshall Space Flight Center, National Space Science and Technology Center, NASA Global Hydrology and Climate Center, 320 Sparkman Drive, Huntsville, AL 35805.

(5) Earth Science Division at NASA Jet Propulsion Laboratory, Water and Carbon Cycles Group, 4800 Oak Grove Drive, Pasadena, CA 91109

Abstract:

Several types of intestinal nematodes, that can infect humans and specially school-age children living in poverty, develop part of their life cycle in soil. Presence and survival of these parasites in the soil depend on given environmental characteristics like temperature and moisture that can be inferred with remote sensing (RS) technology. Prevalence of diseases caused by these parasitic worms can be controlled and even eradicated with anthelmintic drug treatments and sanitation improvement. Reliable and updated identification of geographic areas at risk is required to implement effective public health programs; to calculate amount of drug required and to distribute funding for sanitation projects. RS technology and geographical information systems (GIS) will be used to analyze for associations between *in situ* prevalence and remotely sensed data in order to establish RS proxies of environmental parameters that indicate the presence of these parasites. *In situ* data on helminthisis will be overlaid over an ecological map derived from RS data using ARC Map 9.3 (ESRI). Temperature, vegetation, and distance to bodies of water will be inferred using data from Moderate-Resolution Imaging Spectroradiometer (MODIS) and Landsat TM and ETM+. Elevation will be estimated with data from The Shuttle Radar Topography Mission (SRTM). Prevalence and intensity of infections are determined by parasitological survey (Kato Katz) of children enrolled in rural schools in Boaco, Nicaragua, in the communities of El Roblar, Cumaica Norte, Malacatoya 1, and Malacatoya 2). This study will demonstrate the importance of an integrated GIS/RS approach to define clusters and areas at risk. Such information will help to the implementation of time and cost efficient control programs and sanitation efforts.